



Wrocław, 25-26 May, 2013

Ways to Protolanguage 3



Does Time Perception influence in Language Processing?

Self-paced Reading evidences of “Aspectual Coercion”
in durative events

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Very very roughly speaking..... Aspect is:

**A controversial concept concerning the developmental frame
of linguistic events**

Vendler 1967

Smith 1991

Non-Events →

Durative Events →

Punctual Events →

Vendlerian Classes

States

to know, to be red, to love,

Accomplishments (result)

to clean, to draw

Activities (no result)

to run, to work

Achievements (result)

to break, to explode,

Semelfactives (no results)

to wink, to hop





And what about Aspectual Coercion?

What do we understand when someone says something as:

Moens & Steedman 1988

Pustejovsky 1995

Jackendoff 1997

Dölling 2011

However, the later sentence is different from:

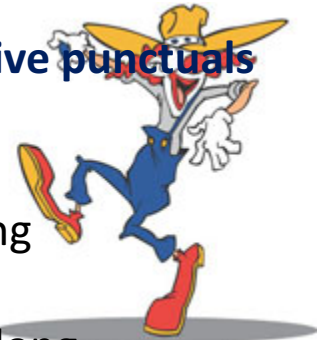
The clown ran for 10 minutes...

The clown jumped for 10 minutes?

This trick work just for non-resultative punctuals

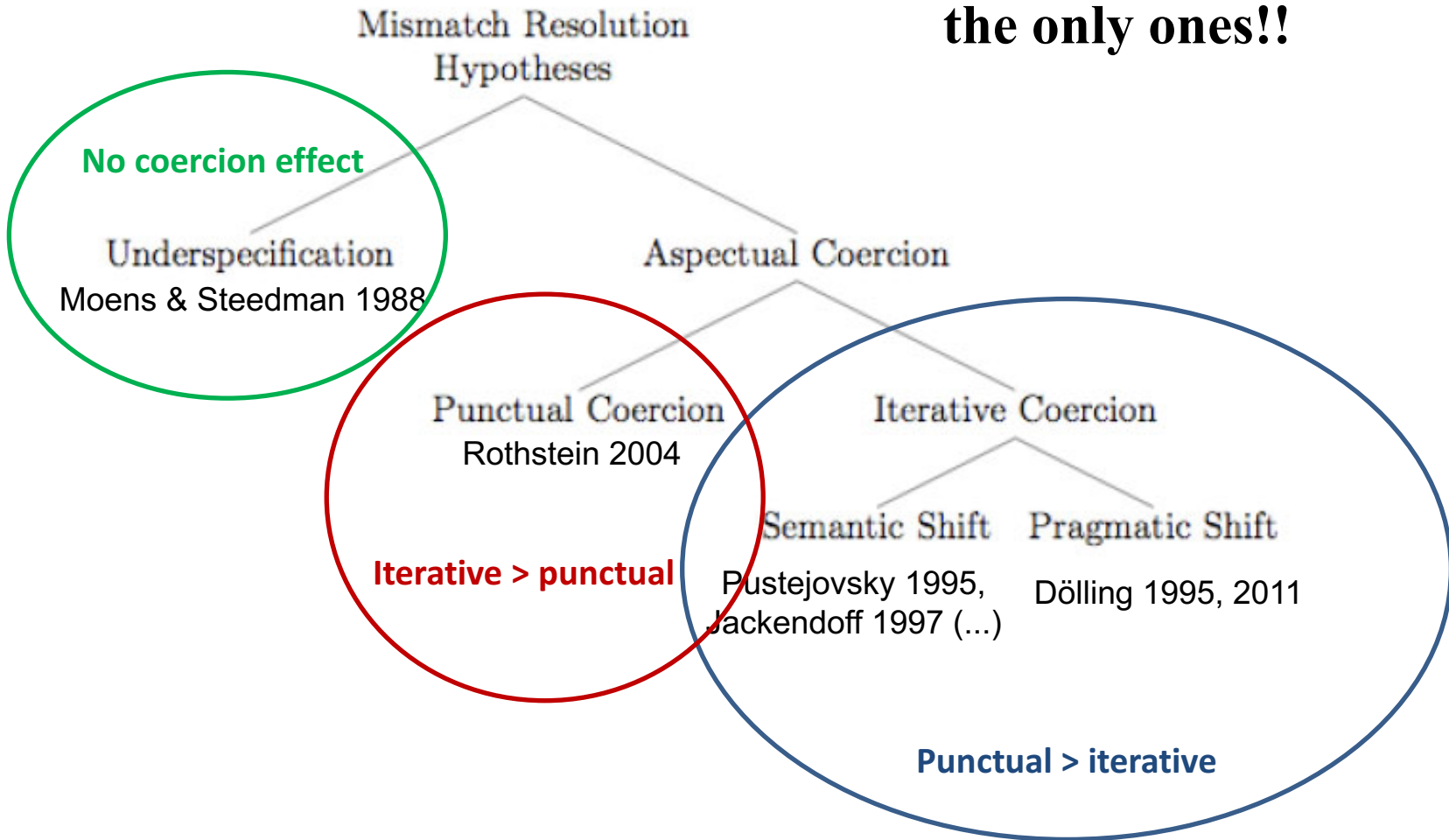
John dived all the day long

??The jar broke all the day long

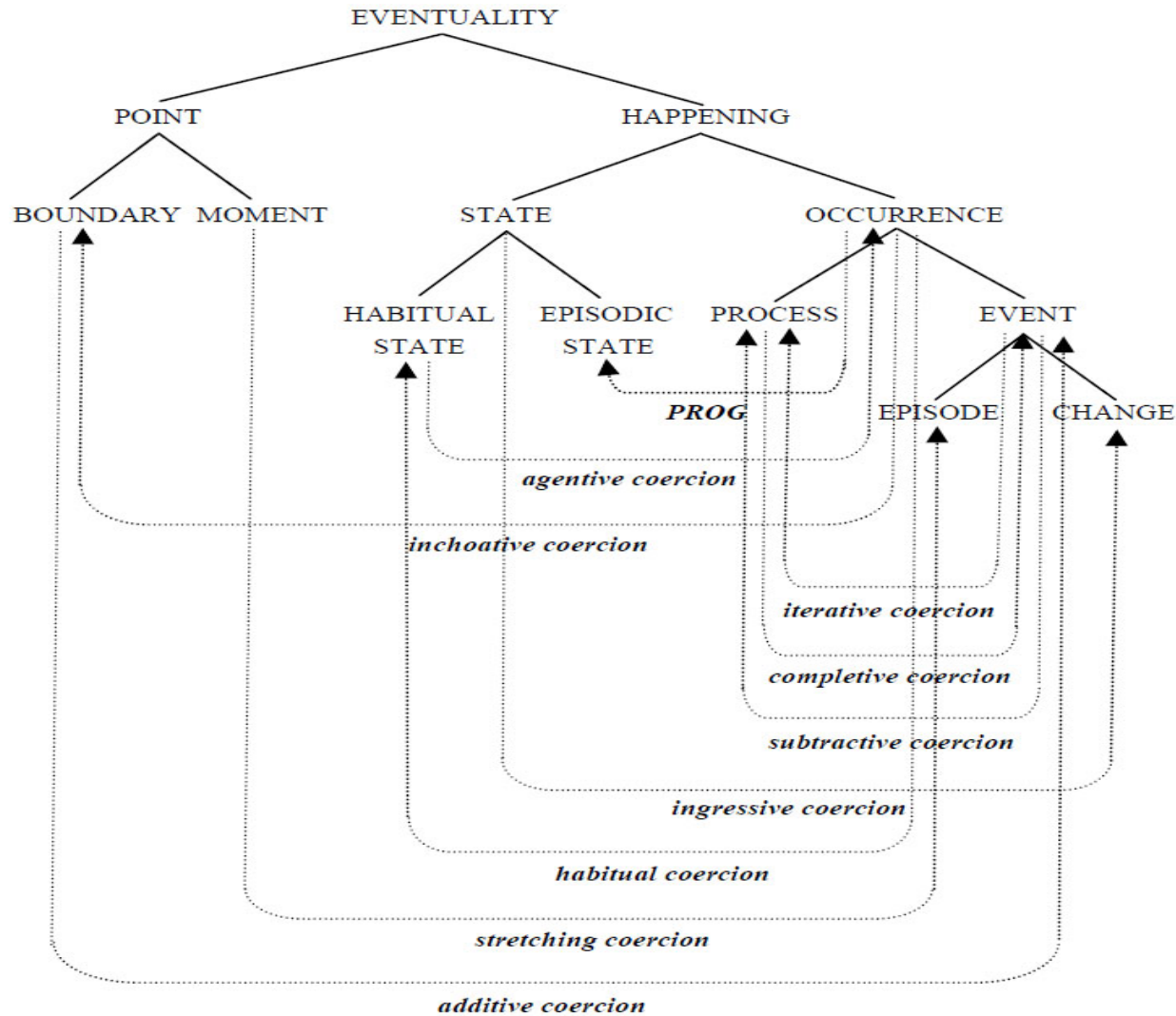




**These are not
the only ones!!**



Brennan & Pylkkänen (2008)



Dölling (2011)

“9” categories of aspectual coercion!!



Is it just theory? Both sentences are read in the same way.... Right?



Negative evidences:

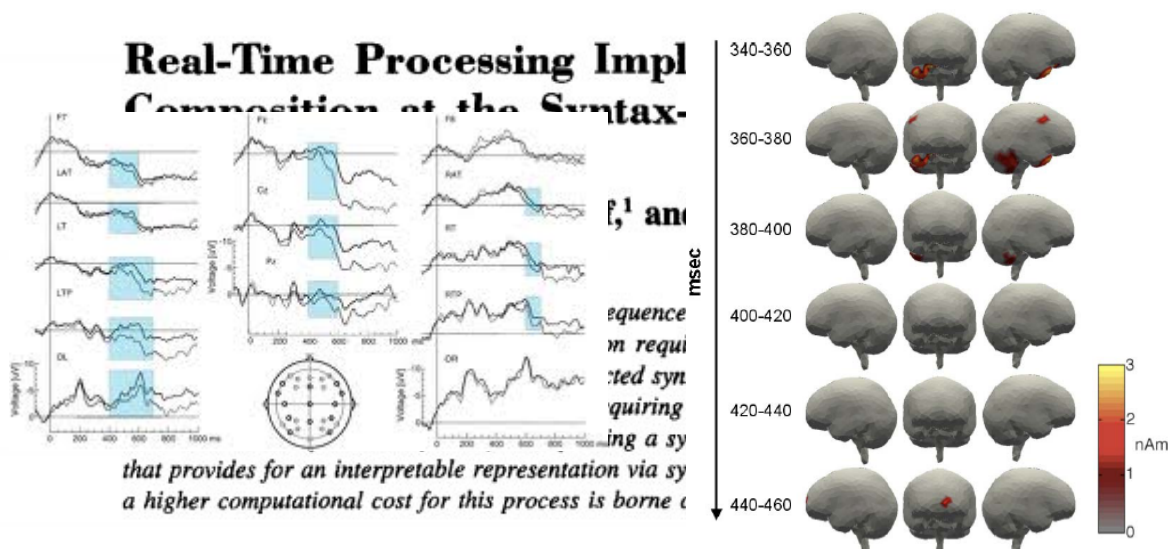
Pickering et al. 2006

Psycholinguistic evidences:

Piñango et al. 1999, 2006; Todorova et al. 2000a,b; Proctor et al. 2004; Husband, Beretta & Stockall 2006, 2008; Brennan & Pylkkannen 2008; Bott 2008, 2010; Sampaio, Maia & França (in prep for resubmitting).....

Neurophysiological evidences:

Brennan & Pylkkannen 2008, Packzymsky & Kuperberg 2011





Pinãngo 1999, Journal of Psycholinguistics

- Dual Task Paradigm
- 25 pairs of experimental auditory sentences and a visual word/non-word decision task (*presented in the moment marked with a star “*”*).

a) The man **examined** the little bundle of fur **for a long time** * to see if it was alive

b) The man **kicked** the little bundle of fur **for a long time** * to see if it was alive

Results presents larger RTs for “iterative coercion” condition

Table I. Mean and Standard Deviation for Each Experimental Condition

	Transparent	Enriched (composition)
Mean	742.68	782.16
Standard deviation	83.1	94.21

pag. 406



Todorova et al. (2000)

Self-paced reading

- a) Even though / Howard *[sent / a large check]* / to his daughter / *[for many years]* / , she refused to accept his money
- b) Even though / Howard *[sent / large checks]* / to his daughter / *[for many years]* / , she refused to accept his money
- c) Even though / Howard *[sent / a large check]* / to his daughter / *[last year]* / , she refused to accept his money
- d) Even though / Howard *[sent / large checks]* / to his daughter / *[last year]* / , she refused to accept his money

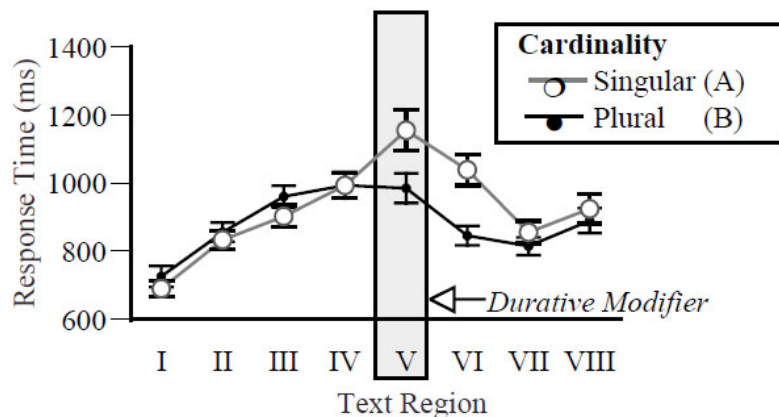


Figure 1: Response latency by text region for **Duratives** by Cardinality of Object

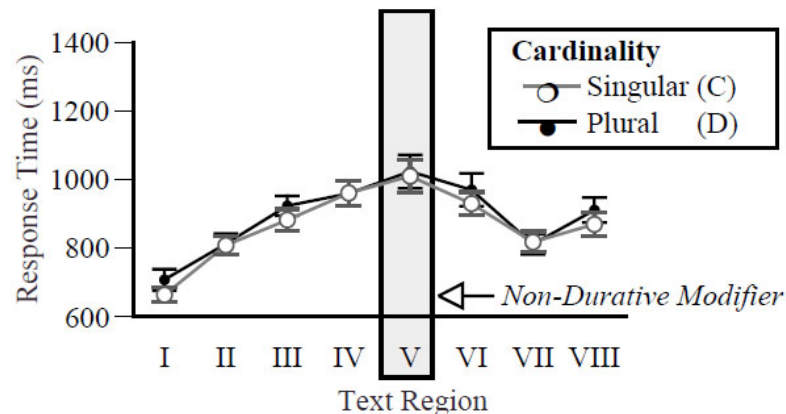
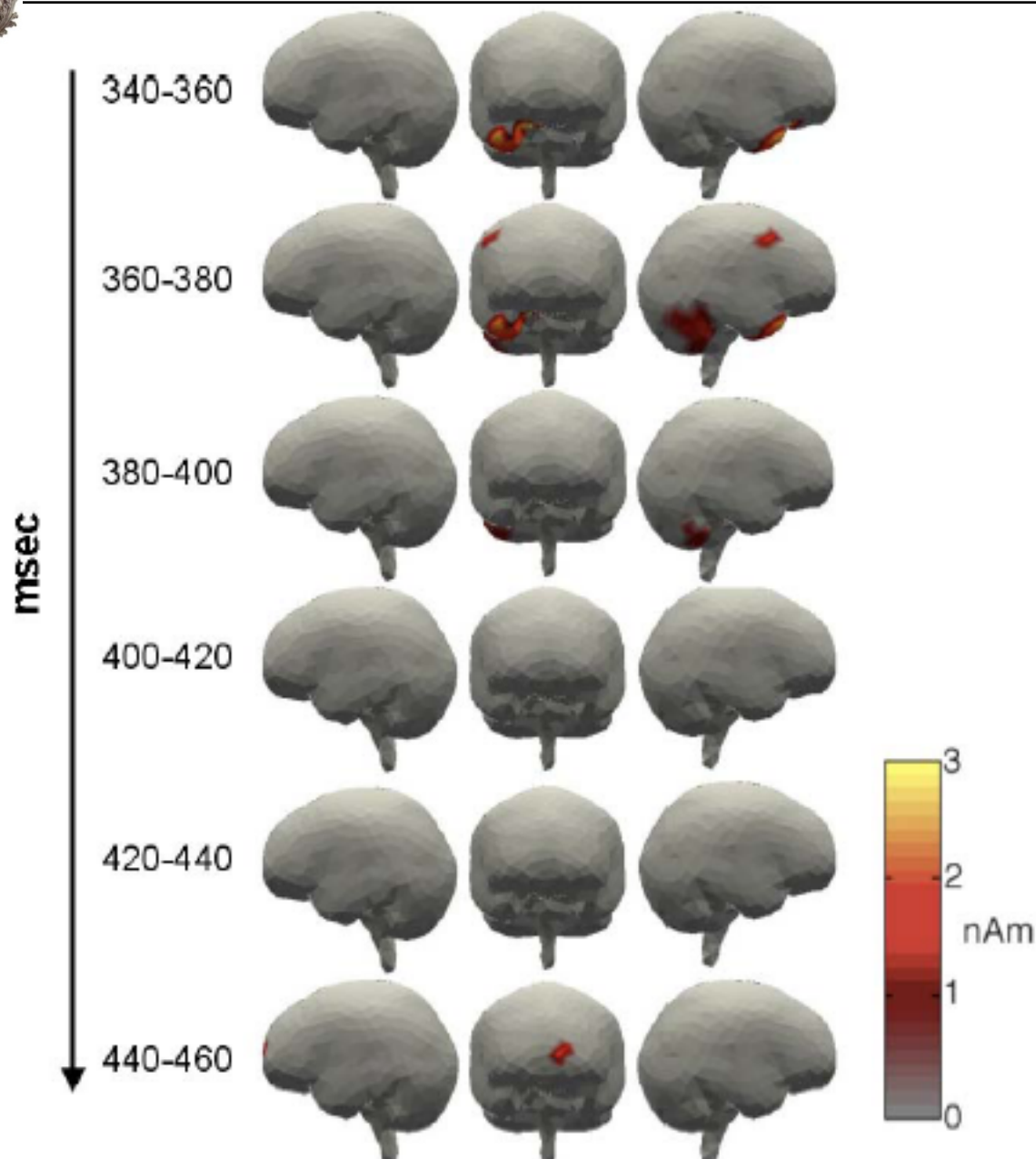


Figure 2: Response latency by text region for **Non-Duratives** by Cardinality of Object

Twice of rejection for “iterative coercion” condition in (a) than for other conditions (19%, 7%, 8% e 9%), and longer reading times in temporal modifiers area.



Brennan & Pylkkanen 2008

Brain and Language

Areas showing reliably increased activity for the Coercion condition in the distributed source analysis.

Earlier right-lateral frontal, anterior temporal and posterior temporal/cerebellar effect at 340–380ms

And a later anterior midline effect at 440–460 ms

Ventromedial pre-frontal Cortex

Also associated to

- **Decision making (reviews em Fellows & Farah, 2007; Wallis, 2007)**
- **Ambiguities (Nieuwland, Petersson & Van Berkum, 2007)**
- **SocioCognition (Theory of Mind)**



Brain & Language

journal homepage: www.elsevier.com/locate/b&l



Short Communication

The Anterior Midline Field: Coercion or decision making?

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Decision making

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ABSTRACT

To study the neural bases of semantic composition in language processing without confounds from syntactic composition, recent magnetoencephalography (MEG) studies have investigated the processing of constructions that exhibit some type of syntax-semantics mismatch. The most studied case of such a mismatch is complement coercion; expressions such as *the author began the book*, where an entity-denoting noun phrase is coerced into an eventive meaning in order to match the semantic properties of the event-selecting verb (e.g., 'the author began reading/writing the book'). These expressions have been found to elicit increased activity in the Anterior Midline Field (AMF), an MEG component elicited at frontomedial sensors at ~400 ms after the onset of the coercing noun (Pykkänen, L., & McElree, B. (2007). An MEG study of silent meaning. *Journal of Cognitive Neuroscience*, 19, 11). Thus, the AMF constitutes a potential neural correlate of coercion. However, the AMF was generated in ventromedial prefrontal regions, which are heavily associated with decision-making. This raises the possibility that, instead of semantic processing, the AMF effect may have been related to the experimental task, which was a sententiality judgment. We tested this hypothesis by assessing the effect of coercion when subjects were simply reading for comprehension, without a decision-task. Additionally, we investigated coercion in an adjectival rather than a verbal environment to further generalize the findings. Our results show that an AMF effect of coercion is elicited without a decision-task and that the effect also extends to this novel syntactic environment. We conclude that in addition to its role in non-linguistic higher cognition, ventromedial prefrontal regions contribute to the resolution of syntax-semantics mismatches in language processing.

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Brennan & Pytkkanen 2008

Can we trust in our own perception of verb meaning?

1) Pre test of “punctuality judgement”

1-7 scale - only verbs 1-3 used in the stimuli;

2) Plausibility Pre-test

=> Main test Task: Gramaticality judgement

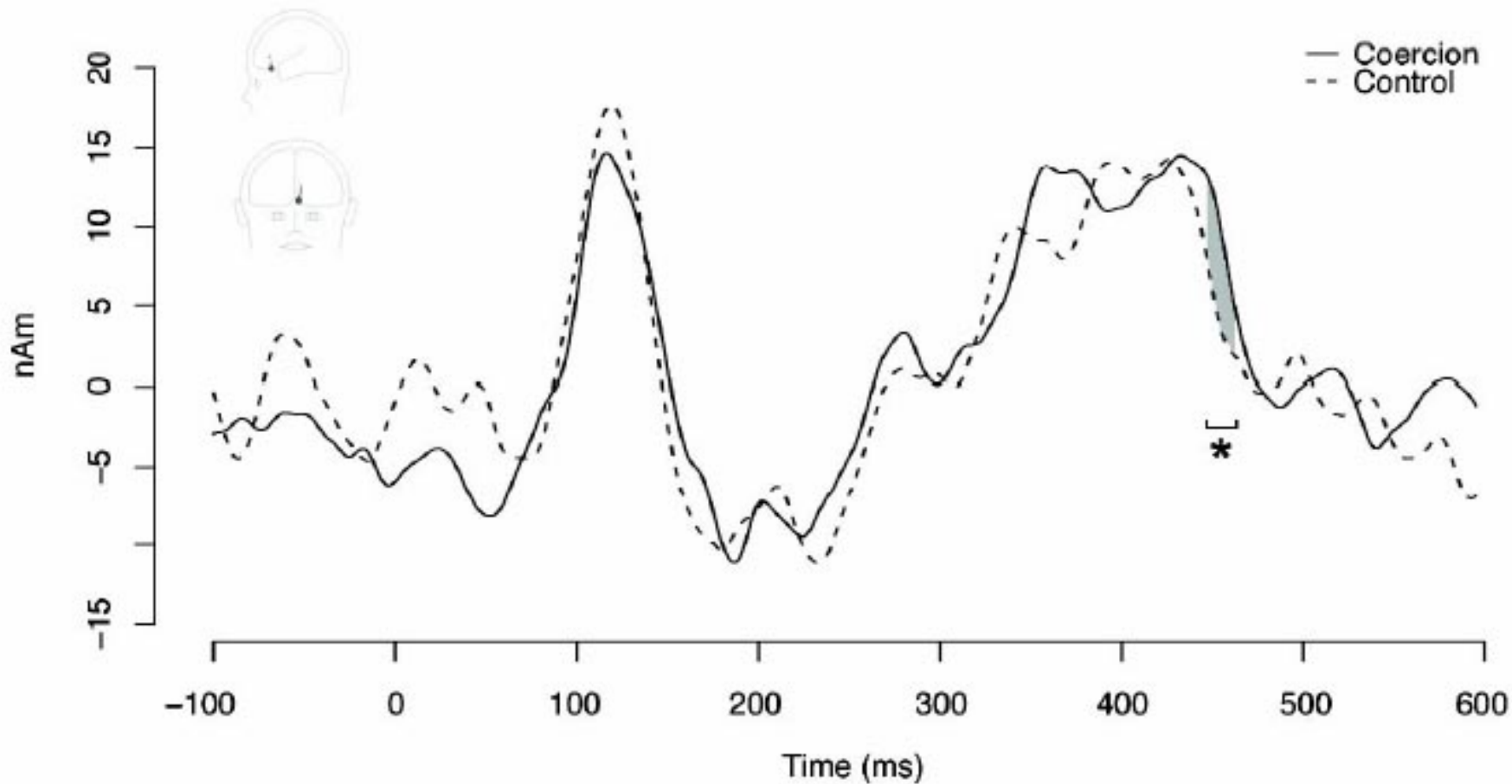
Appendix B

B.1. Stimuli

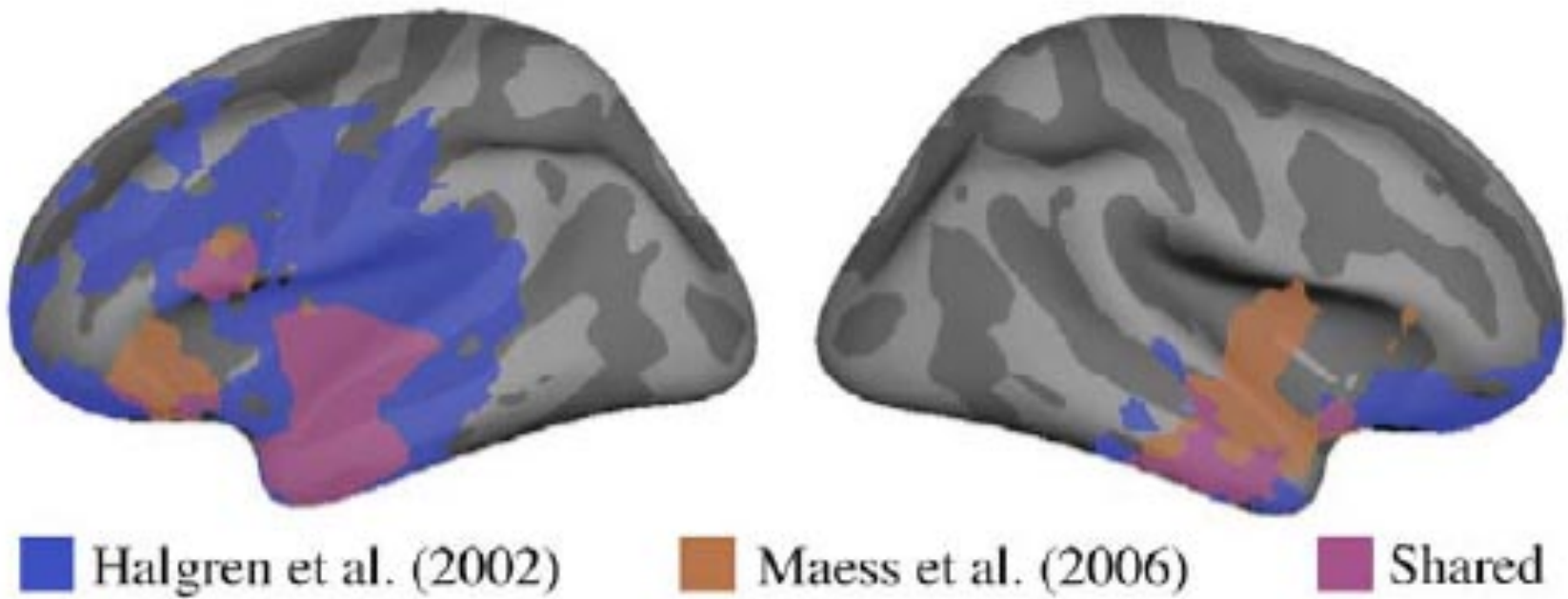
1. a. (coercion) All morning long the cart banged in the cramped store aisle.
b. (control) Just after ten the cart banged in the cramped store aisle.
2. a. For 45 seconds the computer beeped in the busy lab.
b. After 45 seconds the computer beeped in the busy lab.
3. a. For ten minutes the tailor belched on the empty sidewalk.
b. At three o'clock the tailor belched on the empty sidewalk.
4. a. Throughout the day the cannon blasted on top of the castle.
b. At one o'clock the cannon blasted on top of the castle.
5. a. For five minutes the fireman blinked in the dark stairwell.
b. After a minute the fireman blinked in the dark stairwell.
6. a. Throughout the morning the manager burped in the corner office.
b. After a while the manager burped in the corner office.
7. a. For ten minutes the professor called from the cluttered office.
b. After an hour the professor called from the cluttered office.
8. a. All day long the instructor coughed in front of the classroom.
b. After several minutes the instructor coughed in front of the classroom.
9. a. Throughout the evening the princess curtseyed in front of the guests.
b. At nine o'clock the princess curtseyed in front of the guests.
10. a. All afternoon long the dog dived in the olympic-sized pool.
b. Exactly at noon the dog dived in the olympic-sized pool.
11. a. For several seconds the explorer fired beside the big blue lake.
b. After a minute the explorer fired beside the big blue lake.



Figure 4



Grandaveraged source waveforms for the AMF spatial filter applied to the MEG data





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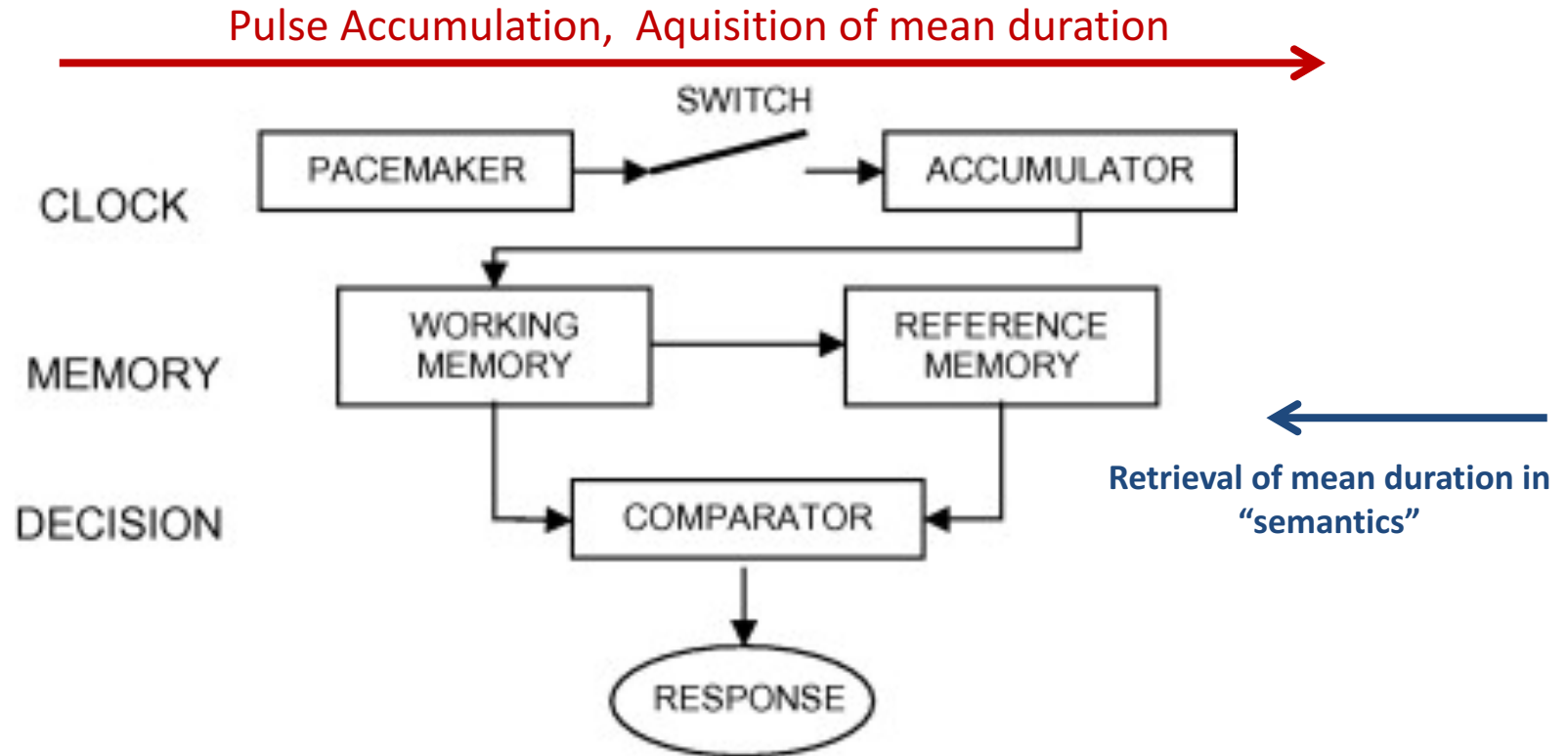
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And as for Time Perception...



Schematic representation of the three-stage internal clock model.
Carroll et al. (2008) Brain and Cognition

Excellent overview in Block 1990
Cognitive Models of Psychological Time

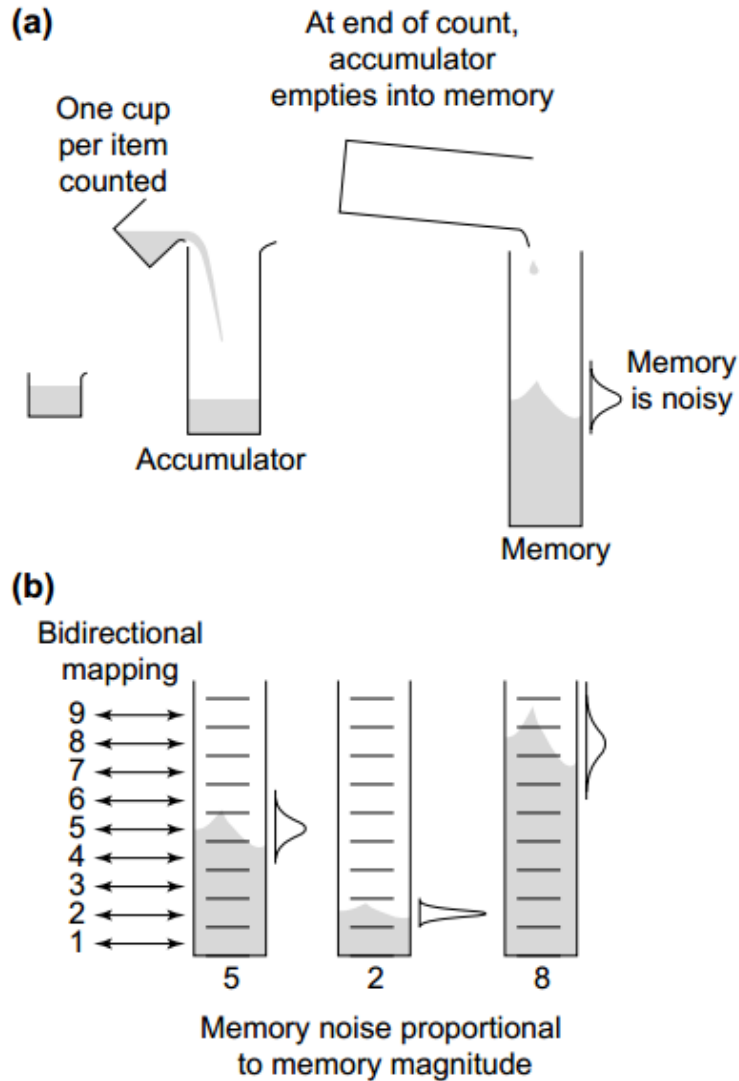


Fig. 2. Cartoon of the accumulator model and the bidirectional mapping hypothesis. This hypothesis is used to explain the results of Whalen *et al.*'s experiment¹⁹. **(a)** The non-verbal counting process increments the accumulator by one 'cup' for each item counted. The accumulation at the end of a count is read into memory. Magnitudes read from memory to serve as the targets in subsequent counting trials exhibit scalar variability, represented here by the sloshing in the beaker, which introduces noise into readings of the beaker (recalled magnitudes). **(b)** Adult humans have learned decision criteria (rulings on the beaker), which enable them to map from a magnitude to a numeral and from a numeral to a corresponding magnitude (bi-directional mapping hypothesis). Whalen *et al.*¹⁹ argue that the magnitude representation of numerosity and the non-verbal counting process that generates the magnitudes make the formally identical verbal counting process intelligible to the very young child and gives the number words their meanings. (Adapted from Ref. 19.)

Galistel & Gelman 2000
Trends in Cognitive Sciences





Given this fast review,

Why coercion should be specifically related to punctual events?

Are there the same effect for durative events?

Does Time Perception influence in Language Processing?

PREDICTIONS:

- 1) If *Time Perception* is relevant for *Language Processing*, what we know as Aspectual Coercion in Psycholinguistics should be seen more as a kind of *Durational* than as an *Aspectual Mismatch*.
- 2) In this sense, events lasting longer than their mean duration should present larger RTs than events in their mean timeframe.



Experiment 1

Sponsors and Hosts:





Experiment 1: Is there “Aspectual Coercion” in durative sentences

METHODS: Participants

- **24** brazilian volunteers (**11 male and 13 female**)
 - **9** female from **Languages**
 - **7** male from **Languages**
 - **4** female from **Biblioteconomy**
 - **4** male from **Engineering**
- **18-25 yo**
- **Normal or corrected to normal vision**



Experiment 1: Is there “Aspectual Coercion” in durative sentences

METHODS: Stimuli and Task

- This Experiment ran in the app **Psyscope X B57** using a **Macbook White Unibody 14” 2.4 GHz Intel Core 2 Duo, 2Gb 667MHz DDR2 SDRAM** running **Mac OSX 10.5.8 Leopard**;
- Stimuli were presented in a Word-by-Word Self Paced Reading with an interpretation question at the end of each stimulus;
- The volunteers use the [**spacebar - in yellow**] to navigate between the words of the sentence and the [**k**] and [**l**] to answer [**yes**] or [**no**] respectively.
- Stimuli were presented in a **black background**
- Font: ***Times New Roman 24 white***.



Experiment 1: Is there “Aspectual Coercion” in durative sentences

METHODS: Stimuli

Experimental Sentences:

- 12 pairs of sentences in Brazilian Portuguese in which the same event is described as having shorter or larger duration:

Examples:

*Although she was injured, Isabelle danced for 3 [**minutes** / **months**] in the studio*

*Although she was exhausted, Paula cooked for 5 [**minutes** / **hours**] in the kitchen*

simple question task: Did Isabelle dance? Did Paula cook?

+

1s

###



três



[minutes / months]



no

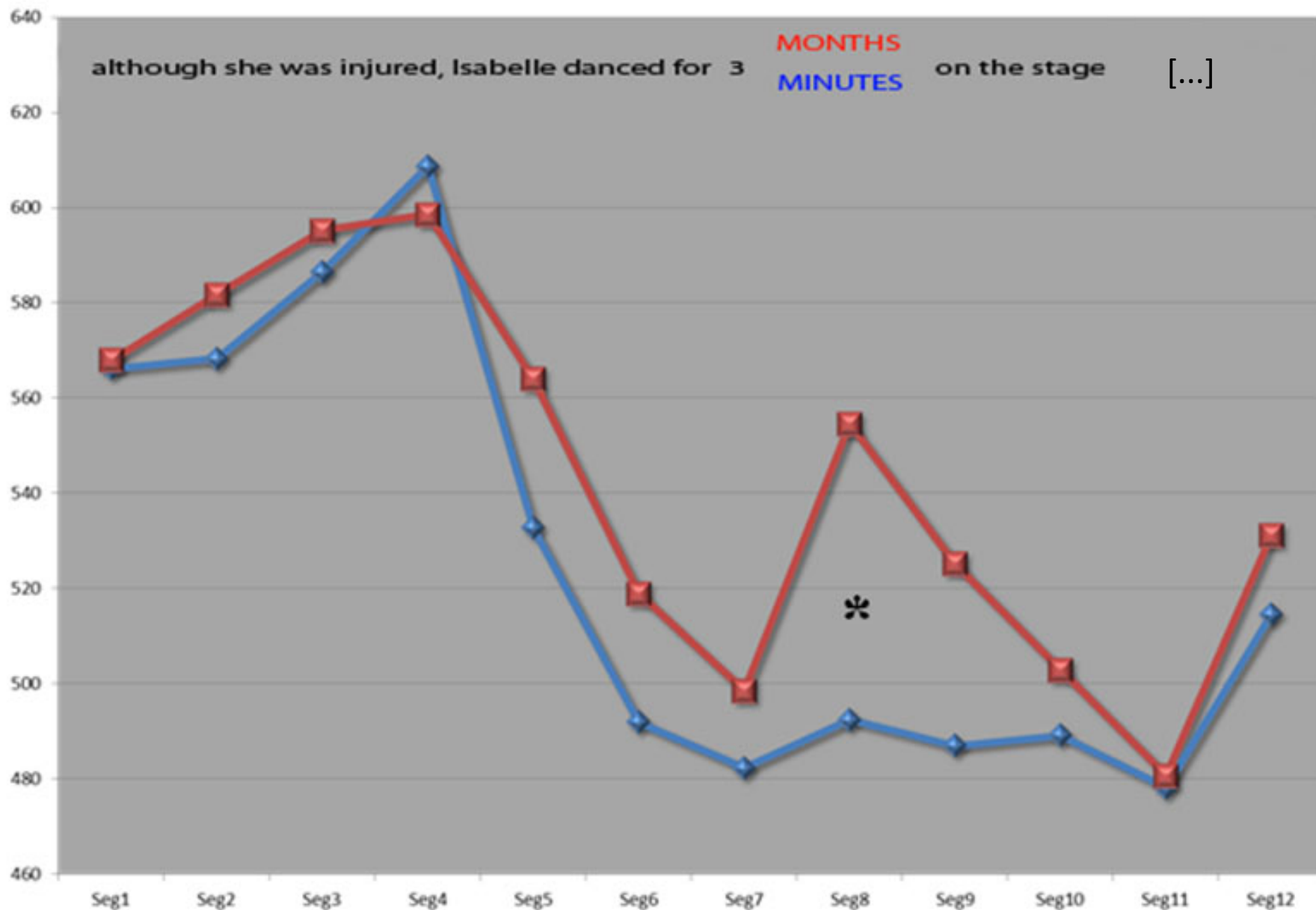


palco

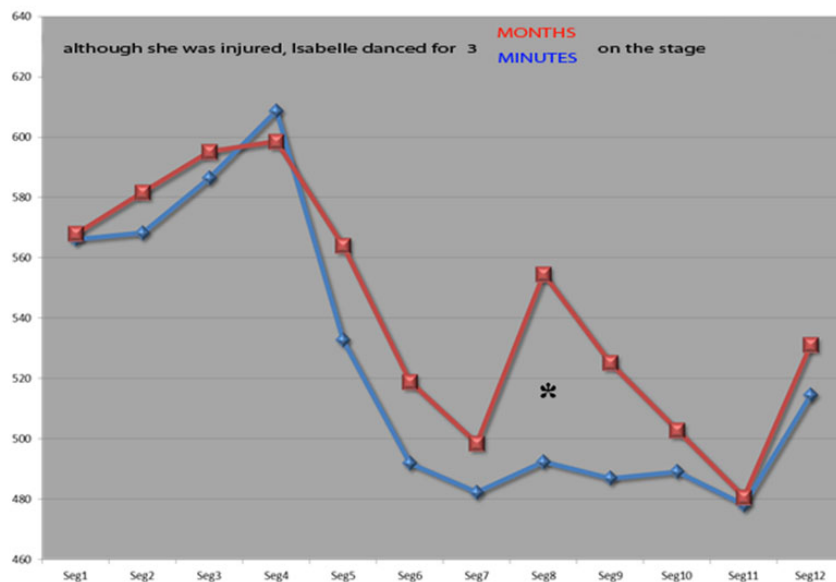


Isabelle dançou?
(Did Isabelle dance?)





Embora estivesse machucada, Isabelle dançou por 3 [time period] no palco [...]



DISCUSSION

First, our results show evidences for a “durational” coercion on durative events.

However:

Concerning the stimuli, are the effects really related to coercion or to a kind of surprise? For example:

“Although she was injured, Isabelle danced for 3 minutes” is pragmatically acceptable. For 3 months is not!!



Experiment 2

Sponsors and Hosts:





(17) Carla caminhou por dez [time period] na praia de Ipanema

Carla walked for ten [time period] on Ipanema Beach

Task: simple questions = Did Carla walk on Ipanema Beach? [yes/no]

(18) Time periods:

a. [minutes]:

b. [days]:

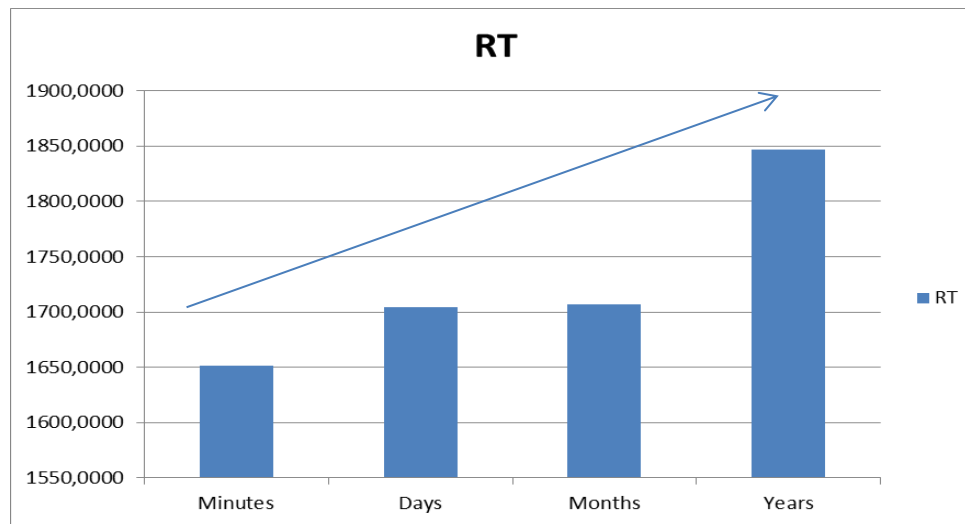
c. [months]:

d. [years]

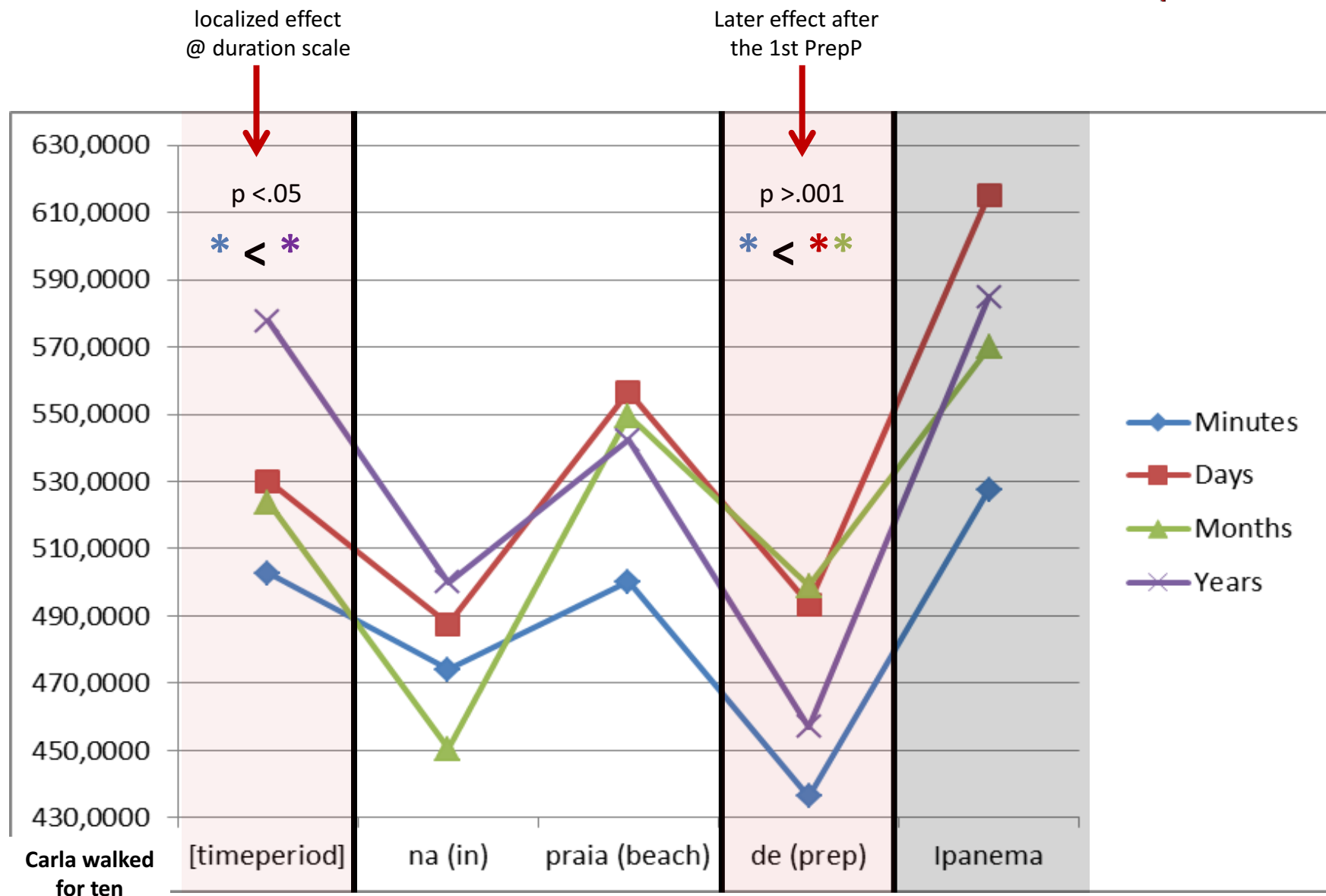
Predictions:

Shorter times are going to present faster RTs

Minutes < days < months < years.



No significance (ANOVA)





Discussion

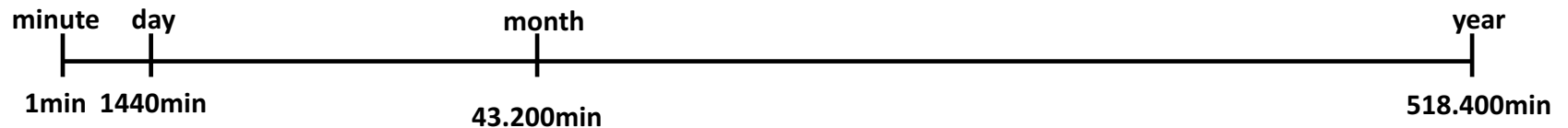
Somehow, coercion effect for larger duration (years) is different than for the closest durations (days, months).

Hypothesis:

A large durational scale has a more accentuated effect (minutes to years);

- the proximity of durational categories

Ex.: minutes-hours / days-weeks-months / years-etc





Discussion

Somehow, coercion effect for larger duration (years) is different than for the closest durations (days, months).

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Ex.: minutes-hours / days-weeks-months / years-etc

OR

Difference in the duration elasticity of some events causing interference in our results.

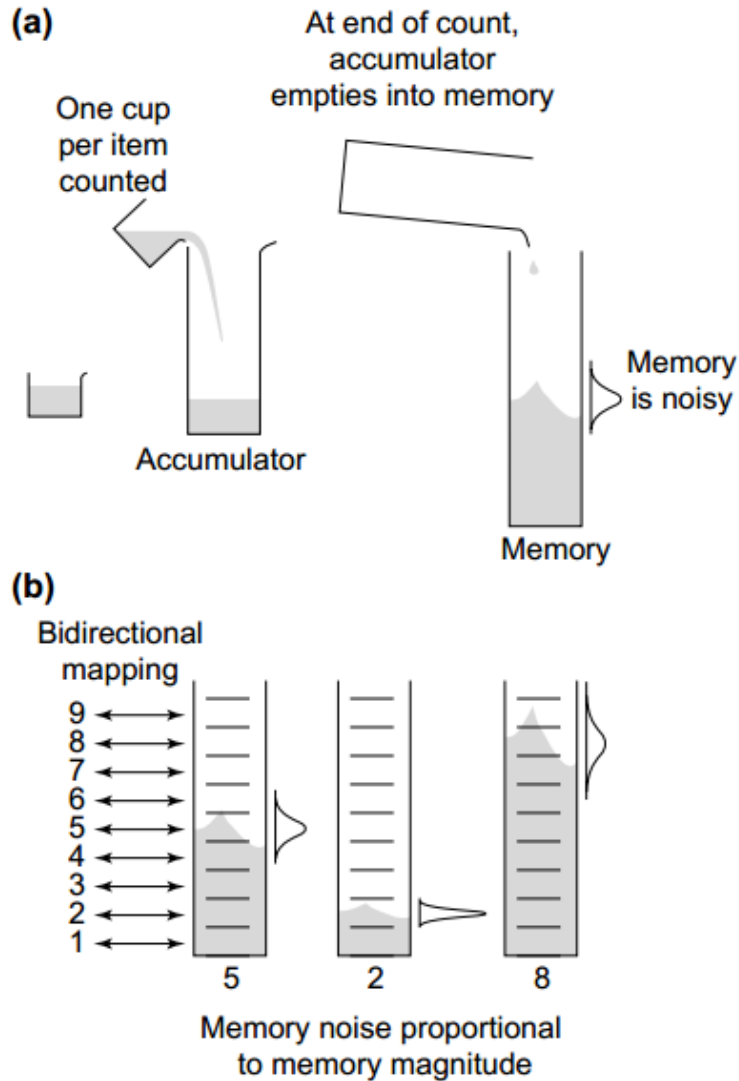


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Discussion

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OR

Difference in the duration elasticity of some events causing interference in our results.

Problems:

How to control the mean duration of events?

Experiment 3

with Virginie van Wassenhove

(Preliminary results)



Sponsors and Hosts:



punctuel

durative

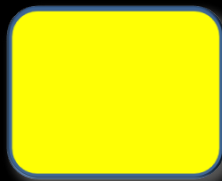
•
marcher



seconde

minute

•
marcher

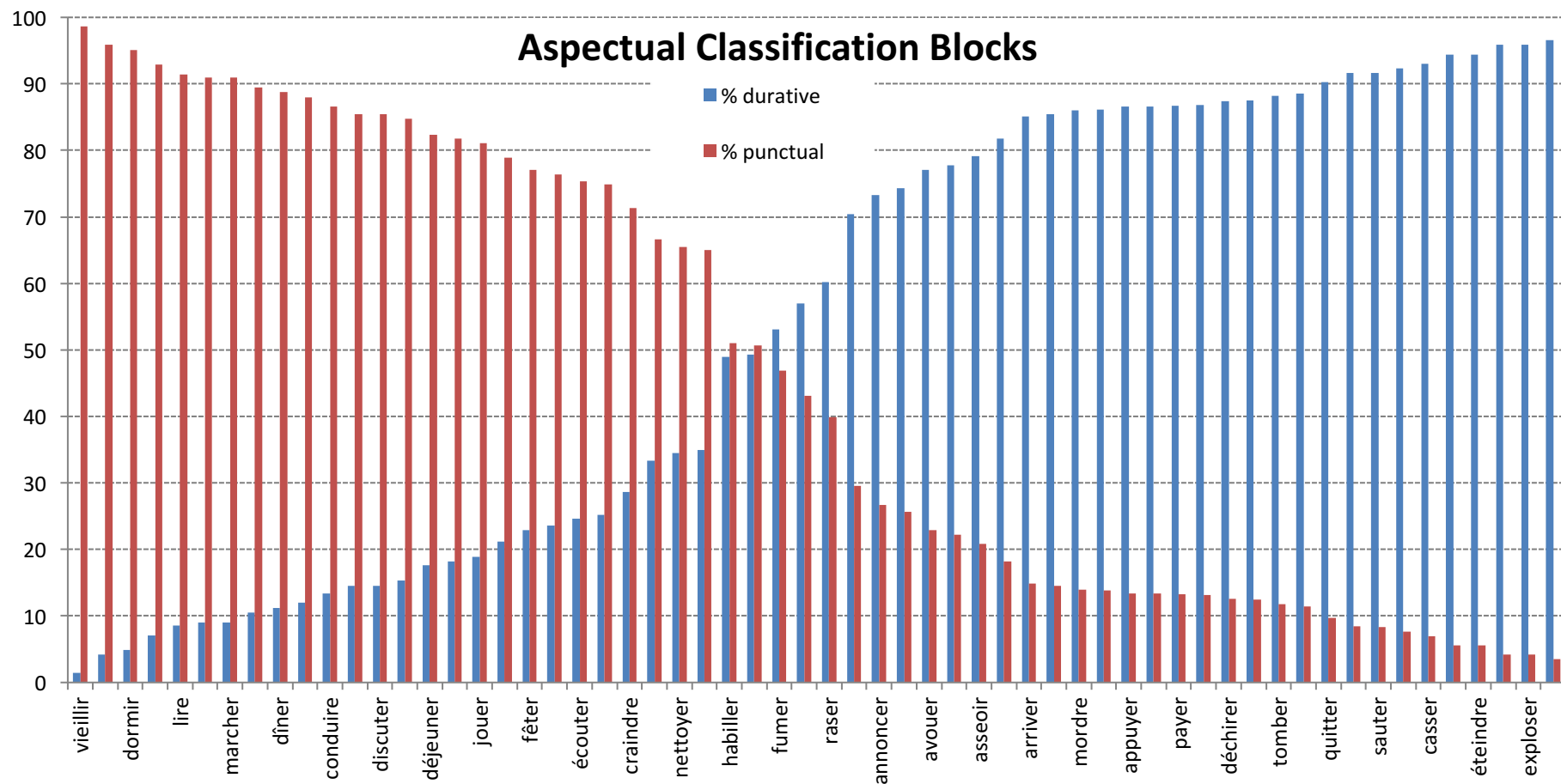


minute

seconde

marcher





Verbs – Duration Association

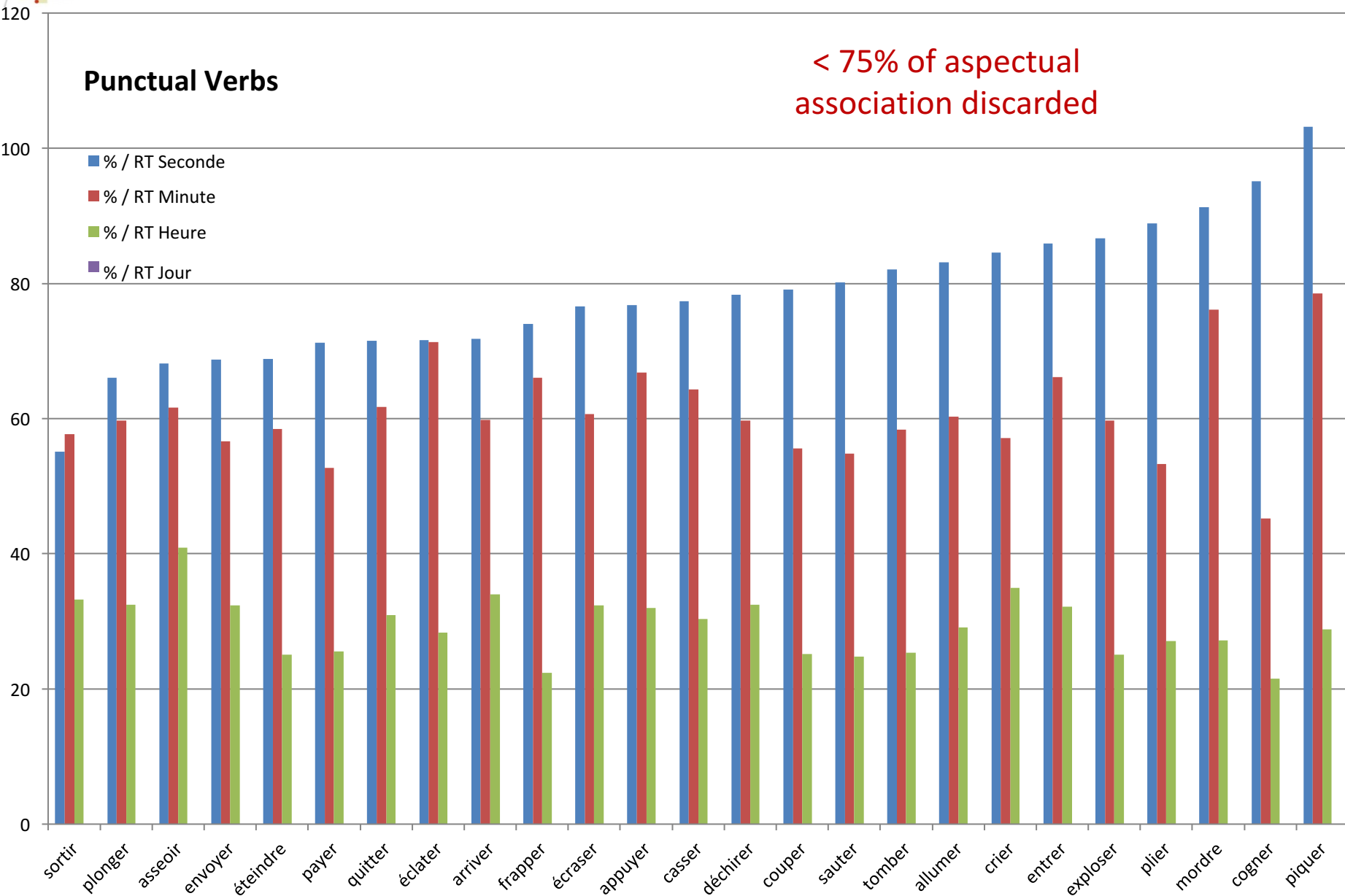
In this task, verbs should be associated to one of two durations presented at the top of the screen.

- **Punctual vs. Durative**
- Punctual verbs are supposed to be associated to the shortest duration
- Durative verbs are supposed to be associated to the largest duration

Punctual Verbs

< 75% of aspectual
association discarded

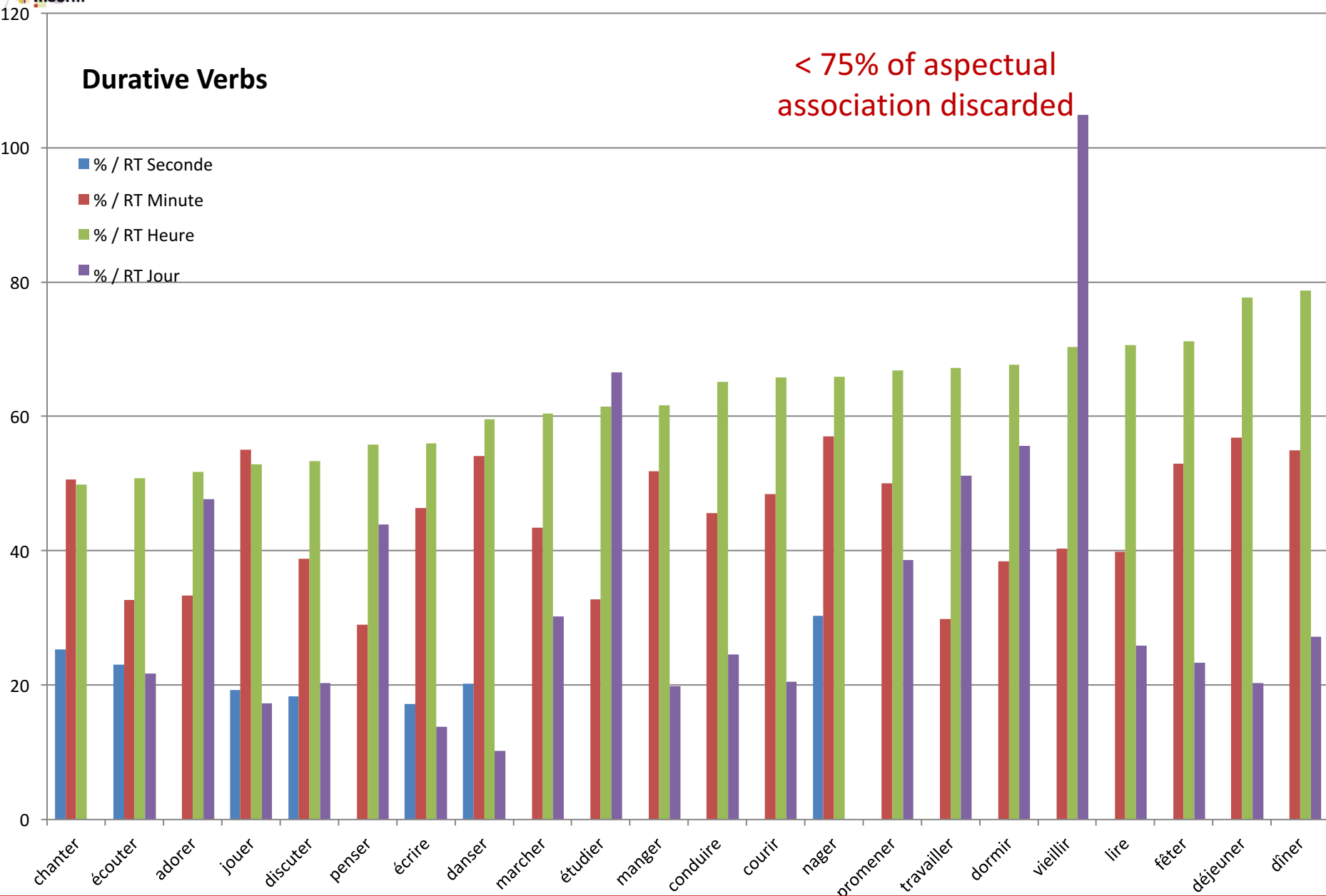
- % / RT Seconde
- % / RT Minute
- % / RT Heure
- % / RT Jour



Durative Verbs

< 75% of aspectual
association discarded

■ % / RT Seconde
■ % / RT Minute
■ % / RT Heure
■ % / RT Jour



Discussion

- 1) As expected, punctual verbs have strong association to short durations than for largest duration...
- 2) The opposite was found for durative verbs. However except for “étudier” and “viellir”, these verbs have a higher preference for “*minute*” and “*hour*” than for “*day*”. Verbs as “nager” and “chanter” have no association to “day” category.
- 3) It seems that our mind has a scale of inherent duration for linguistic events, and its direction can change if we are reading punctual verbs or durative verbs.



Conclusions and ToDos...

- 1) In the first two experiments we found evidences of coercion in durative events...
However;
- 2) In order to look to durative events more carefully, it's necessary to know its mean duration between speakers of one language and match stimuli by its mean duration.
- 3) And once we have some evidences, we expect to find some cortical areas related both to Time Perception and Aspectual Coercion.
- 4) Also, Time Perception seems to be an interesting interface to study event classification or aspectual properties, working as a 3rd factor that can work in parallel with some generative models as Principle and Parameters and Distributed Morphology.
- 5) In this sense, the emergence of Time Perception in primates can be a keypoint to the emergence of Language in humans.



Thank you for your aspec....
Time!

motta @ ufrj.br

